Amendments to the Drawings

Attached are replacement drawing sheets for amended Figures 1, 2, 3, 5, 6a, 6b, 6c, 7 and 8.

REMARKS

The abstract and specification have been amended in order to place them in better form. No new matter has been added.

In order to expedite the prosecution of the present application and comply with requirements of form made by the Examiner, Claims 1-55 have been canceled and replaced by newly presented Claims 56-66 which more particularly point out and distinctly claim the subject matter which Applicants regard as the invention. It is respectfully submitted that the currently presented claims are cured of all formal defects. No new matter has been added.

Acknowledgement is made to the Examiner's objection to the drawings. Enclosed herewith is a replacement Figure 1 in which it is indicated as being prior art. With respect to the conically tapering surface being concave or convex, the word "concave" has been canceled from the claims. The convex surface is shown in Figures 2, 3 and 5. With respect to previously presented Claim 42, a reduced material thickness or an indentation at the hinge-like transition is shown in Figures 6A-6C. With respect to the feature of a cushion portion in previously presented Claims 43-50, the Examiner is referred to Figure 7. With respect to the reference characters that are not discussed in the specification, these characters have been removed from the enclosed amended drawings, except for reference numeral "11", which is discussed in paragraph [0093] of the description. No new matter has been added.

Claims 40-50 have been rejected under 35 USC 112, first paragraph, for containing subject matter which is not described in the specification in a manner to enable one of ordinary skill in the art to practice the present invention. Specifically speaking, the Examiner appears to have a problem with "the limitation of the conically tapering insertion opening preventing the inner annular fold from contacting the teat rubber". However, the Examiner has not set forth reasons

as to why he believes that this limitation is not enabled by the present specification. The present invention clearly provides sufficient instructions as to how the conically tapering insertion opening is to be formed with respect to the shape of the teat and its inner annular fold. By providing a teat rubber in the configuration required by the present claims, the inner annular fold will not contact with the teat rubber. This is stated in the present specification. If the Examiner feels that this statement is inaccurate, he is respectfully requested to provide detailed reasons why. Otherwise, it is respectfully requested that this ground of rejection be withdrawn.

With respect to the rejection of the claims under 35 USC 112, second paragraph, it is respectfully submitted that the currently presented claims are cured of all formal defects. No new matter has been added.

Claims 40-42 have been rejected under 35 USC 102(b) as being anticipated by Goldberg et al. Claims 43-50 have been rejected under 35 USC 103(a) as being unpatentable over Goldberg et al in view of Silver et al. Applicants respectfully traverse these grounds of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a teat rubber for use on a milking cup of a milking apparatus. The teat rubber comprises a head part having provided thereon a sealing lip that forms an insertion opening for teat, a holding edge for grasping a milking cup sleeve, a suction connecting piece connected to the head part as well as a planar teat bearing section which is formed on the sealing lip provided on the head part and which defines the insertion opening. A part of the insertion opening conically tapers towards the inner side of the teat rubber in such a way that an inner annular fold located on the base of the teat cannot come into contact with the teat rubber and that pressure cannot be applied thereto. The teat rubber is characterized in that when seen in a cross-sectional view, a conically

tapering surface of the conically tapering insertion opening is convex or linear and that transitions between the conically tapering surface and a planar teat bearing section, as well as between the conically tapering surface and an udder bearing surface, are respectively implemented in a hinge-like manner.

As discussed in the present specification, the present invention provides a teat rubber which has improved properties with respect to natural and species-appropriate milking, which allows the teat rubber to be easily applied, adhere well to the teat and not strangulate the inner annular fold. This is obtained by providing a teat rubber having the currently claimed construction. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Goldberg et al reference discloses an inflation for a teat cup in which an integral annular bead is spaced slightly less than a teat's length below the upstream end of the inflation. Axial ribs are spaced around the circumference of the tube upstream of the annular bead and the bead and ribs are resistive of collapse to provide a gentle massaging action on the teat when pulsating pressure is applied. The Examiner states that in the teat cup of Goldberg et al, a transition between the conically tapering surface and the planar teat bearing section and the udder bearing surface is implemented in a hinge-like manner. Applicants respectfully disagree. A hinge is defined as a joint that holds two parts together so that one can swing relative to the other. In contrast thereto, in Goldberg et al, the skirt 50 and the cushion 52 is formed much thinner than the remainder of the head portion 40 so that the teat rubber is particularly smooth and flexible in order to provide a tight fit and minimize irritation to the teat and udder. Therefore, the structure of Goldberg et al does not function as a hinge and the presently claimed invention is patentably distinguishable thereover.

The Silver et al reference discloses inner and outer shield parts of a breast shield which are joined to form an

enclosure defining a pressurizable chamber. This reference has been cited by the Examiner as teaching a teat receiving portion having cushioned surfaces planar teat bearing sections. However, the Silver reference does not cure the deficiencies of the primary Goldberg et al reference and, as such, it is respectfully submitted that the presently claimed invention is patentably distinguishable over the combination thereof.

It has been noted that the Examiner has stated that a certified translation of the foreign priority document must be submitted in order for Applicants to get benefit of the foreign priority application. The Examiner is informed that a certified translation of the foreign priority document is only required when it is necessary to use the foreign priority date to overcome a reference cited in a rejection under 35 USC 102 or 103. Since the present application is a nationalized application of a PCT application, a copy of the foreign priority document should have been submitted to the Patent Office from the International Bureau and this is sufficient to gain the benefit of the foreign priority document. As stated above, Applicants are enclosing herewith an English translation of the foreign priority document but it is not required to submit an English translation of the foreign priority document to gain benefit unless it is necessary to overcome a reference.

Favorable consideration of the present application is respectfully solicited.

Respectfully submitted,

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Encl: Replacement Abstract
Marked-Up Substitute "Summary of the Invention" Section
Replacement drawing sheets for amended
Figures 1, 2, 3, 5, 6a, 6b, 6c, 7 and 8
English translation of Foreign Priority Document
Postal Card

136.07/05

TEAT RUBBER

ABSTRACT

A teat rubber for use on a milking cup of a milking apparatus, ~~comprising~~is made up of a head part having provided thereon a sealing lip that forms an insertion opening for a teat, a holding edge for grasping a milking cup sleeve, a suction connecting piece connected to the head part as well as a planar teat bearing section which is formed on the sealing lip provided on the head part and which defines the insertion opening, characterized in that the teat rubber ~~comprises~~has an adhesion element that improves the adhesion between the teat and the teat rubber without affecting the milking process.

SUMMARY OF THE INVENTION

[0016] It is the object of the present invention to provide a teat rubber which has improved properties with regard to natural and species-appropriate milking, which allows the teat rubber of the type specified at the beginning to be easily applied, which adheres well to the teat and which does not strangulate the inner annular fold (Fuerstenberg'schen Venenring).

[0017] This object is achieved by a teat rubber of the type specified at the beginning, which is characterized in that the teat rubber comprises an adhesion element that improves the adhesion between the teat (190) and the teat rubber without affecting the milking process.

[0018] In an embodiment ~~according to claim 2~~, the adhesion element is realized by a pre-stressing element which exerts a radially effective force on the planar teat bearing section. By means of the elastic pre-stressing means, it is achieved that sufficient pressure will always be applied to the teat so that the sealing and holding function will be guaranteed.

[0019] In ~~an~~another embodiment ~~according to claim 3~~, the pre-stressing element is implemented such that it is able to cause a reduction of the radius of the insertion opening. Additional pressure can thus be applied to the teat via the planar teat bearing section so that the adhesion between the teat rubber and the teat will be improved.

[0020] In a further embodiment ~~according to claim 4~~, the pre-stressing element comprises an annular element. The annular element encompasses an area around the planar teat bearing section and produces the additional pressure in this way.

[0021] In a further embodiment ~~according to claim 5~~, the annular element is produced from a resilient plastic material, preferably rubber, or from metal, preferably a spring steel. These materials are advantageous insofar as they are easy to process and insofar as they can have a high strength on the one hand and resilient properties on the other.

[0022] In still another embodiment ~~according to claim 6~~, the annular element is arranged on an inner wall of a cavity in the head part of the teat rubber.

[0023] In a further embodiment ~~according to claim 7~~, a boundary of the planar teat bearing section has formed thereon a first projection which is directed towards the cavity and which prevents the annular element from slipping off.

[0024] In a further embodiment ~~according to claim 8~~, the inner wall of the cavity has formed thereon a second projection adjacent said first projection in such a way that the space between said first and second projections forms a groove which accommodates the annular element.

[0025] Said first and second projections bring the annular element to the desired pressure-exerting position.

[0026] In a further embodiment ~~according to claim 9~~, the annular element is arranged on an outer wall of the head part of the teat rubber. The area via which the prestress of the annular element is transmitted to the resilient teat rubber can thus be enlarged. In addition, the annular element is more easily accessible.

[0027] In still another embodiment ~~according to claim 10~~, the annular element is provided with a folding mechanism by means of which said annular element can be changed over between two cross-sections. The cross-section of the insertion

opening can thus be varied such that the teat can easily be inserted and that sufficient adhesion and leak tightness will be achieved during milking.

[0028] In a further embodiment ~~according to claim 11~~, the folding mechanism comprises hinge portions so that a subarea of the annular element can change between a folded and an unfolded condition, when pressure is radially applied to the annular element. Making use of this embodiment of the annular element, it is possible to simultaneously hold the milking cup and change the radius of the annular element with one hand. This will facilitate insertion of the teat in the teat rubber.

[0029] In a further embodiment ~~according to claim 12~~, the outer wall of the head part comprises at least two depressions with different outer diameters in which the annular element can be arranged in a displaceable manner so that the cross-section of the insertion opening can be varied. The ring can thus be positioned at these two locations with the depressions which are provided in the head part and which have different outer diameters. The cross-section of the resilient insertion opening can be varied in this way, and adapted to various teat sizes in each individual case.

[0030] In another embodiment ~~according to claim 13~~, the pre-stressing means comprises resilient lamellae which are arranged between the teat bearing section and the head part. A defined pressure can thus be applied to the teat.

[0031] In still another embodiment ~~according to claim 14~~, the lamellae are arranged radially. This allows the application of a radially uniform pressure.

[0032] In another embodiment ~~according to claim 15~~, the radially arranged lamellae are implemented such that they

comprise a Y-shaped bifurcation in the radial direction. This will lead to a particularly uniform distribution of pressure.

[0033] In ~~an~~another embodiment ~~according to claim 16~~, the subareas of the planar teat bearing section are movable in a radial direction. This allows an adaptation to various teat sizes.

[0034] By means of the planar teat bearing section, the pressure applied to the teat is reduced so as to protect the teat, and the adhesion and sealing properties are enhanced at the same time. The subareas that are movable relative to one another will improve the adaptability to various shapes and sizes of the teat. It is, for example, possible to expand the insertion opening, since an angle between the sealing lip and the planar teat bearing section, which defines an enlarged boundary, is variable. The shape and the opening angle of the teat insertion opening can thus be varied and implemented such that it will be more easily adaptable to various shapes of teats and directions of insertion. The teat can be introduced more easily.

[0035] In a further embodiment ~~according to claim 17~~, subareas of the planar teat bearing section are therefore movable with respect to an angular position relative to the sealing lip. This allows an adaptation to various teat shapes.

[0036] In another embodiment ~~according to claim 18~~, the movability of the subareas of the planar teat bearing section relative to one another and relative to the sealing lip is achieved by the use of a soft, resilient material. The use of this material will increase the animal's well-being during the milking process and a higher yield will be obtained.

[0037] In another embodiment ~~according to claim 19~~, the elastic material is latex or silicone rubber. These materials

exhibit a particularly high degree of adaptability and are, in addition, extremely skin friendly so that this will in particular improve the cow's well-being.

[0038] In another embodiment ~~according to claim 20~~, the movability of the subareas of the planar teat bearing section is achieved by overlapping segments. This will improve the adaptability to various teat diameters, whereby the vacuum in the suction connecting piece will be sealed off from the surrounding air in a particularly effective manner.

[0039] In another embodiment ~~according to claim 21~~, the above-mentioned segments are resiliently interconnected. This represents an alternative realization for the movability of the subareas of the planar teat bearing section in the case of which a particularly high variability of the insertion opening is achieved.

[0040] In ~~an~~another embodiment ~~according to claim 22~~, the subareas of the planar teat bearing section are interconnected by a constriction and/or a portion of reduced material thickness, whereby the movability of the subareas relative to one another is achieved.

[0041] In another embodiment ~~according to claim 23~~, the subareas of the planar teat bearing section are interconnected by a section whose material properties have been changed. This is another possibility of obtaining a movable connection between the enlarged boundary and the sealing lip.

[0042] In another embodiment ~~according to claim 24~~, the subareas of the planar teat bearing section are interconnected through portions consisting of a material that is softer than the material of said subareas. A movable connection can be established e.g. by locally treating the sealing lip and/or the planar teat bearing section with plasticizers.

[0043] In ~~an~~another embodiment ~~according to claim 25~~, the head part of the teat rubber has predetermined bending points, said predetermined bending points leading to a deformation of the head part, when a pressure difference between the pulsation chamber and the surroundings is generated. The inner surfaces of the teat rubber obtained by this structural design are particularly easy to clean.

[0044] In still another embodiment ~~according to claim 26~~, the predetermined bending points are arranged such that the planar teat bearing section on the head part is adapted to be moved alternately towards and away from the pulsation chamber in accordance with a change of pressure. These predetermined bending points favour movements of the teat cup in vertical and lateral directions relative to the teat, whereby the teat and the udder will be massaged.

[0045] In another embodiment ~~according to claim 27~~, the teat bearing section is releasably connected to the head part. This allows a replacement of the enlarged boundary e.g. by a boundary having a different diameter for better adaptation to other teat shapes.

[0046] In another embodiment ~~according to claim 28~~, the releasable teat bearing section is implemented as a resilient formed part having a shape similar to that of a hollow cylinder and including in the outer surface thereof a circumferentially extending indentation which is adapted for engagement with the sealing lip. A reliably fixed, but nevertheless releasable enlarged boundary will be obtained in this way.

[0047] In a further embodiment ~~according to claim 29~~, an inner width of the outer, circumferentially extending indentation exceeds the thickness of the sealing lip so that a

movable connection can be established between the teat bearing section and the sealing lip. This has the effect that a wedge-shaped gap is formed between the sealing lip and the enlarged boundary, which is implemented as a resilient formed part having a shape similar to that of a hollow cylinder and including a circumferentially extending indentation in the outer surface thereof.

[0048] In still another embodiment ~~according to claim 30~~, a part of the insertion opening has a conically tapering surface, which conically tapers towards the inner side of the teat rubber in such a way that the inner annular fold (Fuerstenberg'sche Venenring) (150) located on the upper end, i.e. the base of the teat cannot come into contact with the teat rubber, and that pressure cannot be applied thereto, not even if the milking cup should shift in the direction of the udder. Furthermore, an effect will be produced in the case of which the lower edges of the planar teat bearing section move towards the teat, when the teat rubber slips inadvertently downwards and off the teat. The insertion opening will thus become narrower and the adhesion between the teat rubber and the teat will improve. These advantages will make it possible to solve, in combination with this feature, the above-mentioned problems by a teat rubber of the type specified at the beginning.

[0049] In another embodiment ~~according to claim 31~~, the boundary of a wide opening of the conically tapering insertion opening is followed by an udder bearing surface by means of which the teat with the inner annular fold or with parts of the udder can be prevented from being drawn into the teat rubber by a milking vacuum, when the udder shrinks during the milking process, so that said inner annular fold cannot enter the narrow, pressure-exerting area of the teat rubber.

[0050] Another embodiment ~~according to claim 32~~ specifies that, when seen in a cross-sectional view, a conically tapering surface of the conically tapering insertion opening is concave, convex or linear.

[0051] In ~~an~~another embodiment ~~according to claim 33~~, a transition between the conically tapering surface and the planar teat bearing section and the udder bearing surface, respectively, is implemented in a hingelike manner. The hinges will intensify an effect of the conically tapering surface in the case of which the lower edges of the planar teat bearing section move towards the teat, when the teat rubber slips inadvertently downwards and off the teat. The insertion opening will thus become narrower and the adhesion between the teat rubber and the teat will improve.

[0052] In another embodiment ~~according to claim 34~~, the hingelike transition between the conically tapering surface and the planar teat bearing section and the udder bearing surface, respectively, comprises a portion of reduced material thickness, an indentation or a variation of the material properties in comparison with the properties of the adjoining material, so that the transition will assume hingelike properties.

[0053] In another embodiment ~~according to claim 35~~, at least a part of the planar teat bearing section and/or of the inner surfaces of the suction connecting piece has cushioned surfaces. The teat contact areas of the teat rubber will thus encompass the teat in a particularly gentle manner and a more natural milking process will be achieved.

[0054] In still another embodiment ~~according to claim 36~~, the cushioned surface consists of a foamed elastomer. This leads to an advantageous change of the resilient properties of

the elastomer for the milking process and to a reduction of weight.

[0055] In still another embodiment ~~according to claim 37~~, the foamed elastomer is a foam silicone. Silicone is known to be particularly skin friendly and, due to the foaming, the resilient properties of said material will be improved and the weight will be reduced.

[0056] In another embodiment ~~according to claim 38~~, the foamed elastomer is sprayed onto the surface of the component in question.

[0057] In another embodiment ~~according to claim 39~~, the whole planar teat bearing section and/or the suction connecting piece consist of the foamed elastomer.

[0058] The two last-mentioned embodiments are alternative embodiments that can be chosen depending on whether an optimized weight or a higher stability is to be achieved. However, hybrid forms are imaginable as well, in the case of which the parts of the teat rubber which are subjected to particularly high stress are implemented such that an optimum durability will be achieved, i.e. as non-foamed components, and the parts that are in intensive contact with the skin and subjected to little stress are implemented as skin-friendly and weight-optimized, i.e. foamed components.

[0059] In still another embodiment ~~according to claim 40~~, the cushioned surfaces are implemented as cushioned pockets. The term pocket stands here for areas which are raised relative to the adjoining areas. Such pockets will be advantageous, when a particularly thick cushion is to be provided on the teat bearing surfaces alone, without impairing the stability and the durability.

[0060] Alternatively to or in combination with the foamed pockets, the cushioned surfaces are~~, according to claim 41,~~ implemented as a fluid-filled pad, in particular as a gas-filled pad. A gas-filled pad has the advantage that the size and the resistance of the pad can be adjusted by varying the pressure. This will improve the flexibility in the case of different teat sizes.

[0061] In still another embodiment~~ according to claim 42~~, the cushioned pocket or the fluid-filled pad is a replaceable insert. The cushioned pocket or the gas-filled pad can thus be replaced easily, if the pad/cushion should be damaged. Furthermore, pads/cushions of different sizes can be used, depending on the respective teat size; this will increase the flexibility of the system. The replaceable insert can again by implemented as an annular component and with a suitable elasticity, so as to improve the adhesion of the teat rubber.

[0062] It should be pointed out that the above-mentioned features can be combined, individually or in combination, with a teat rubber of the type specified at the beginning.